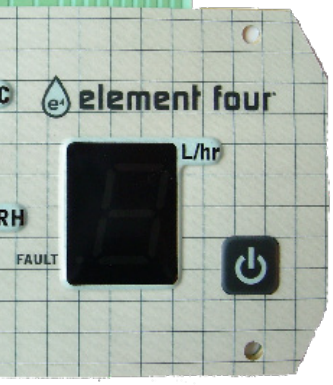
Advanced Manufacturing • Durable Graphics

Ampco

Certified System TS 16949

3M Preferred Converter



Design Guidelines for Membrane Switches & Graphic Overlays

Membrane Switches and Graphic Overlays make for a rugged, instructional, and aesthetic input device for front face of your product.

Ampco Manufacturers experienced sales and design teams have helped our clients design effective membrane switches and graphic overlay solutions for hundreds of successful products.

This guide is made for those who are new to specifying a membrane switch or graphic overlay for their product or for those that need a handy reference guide. If you need more information please feel free to contact us at 1.800.663.5482 or 604.472.3800 for assistance.

General considerations before drawing

ENVIRONMENTAL

- What temperature and humidity range will this product experience?
- What types of contaminants or solvents will come into contact with this product?
- Will this product be used indoors, outdoors, or exposed to the elements?

ELECTRICAL

- How many switches will there be?
- What type of pinout or matrix will be used? (common bus, X-Y matrix, other)
- What closed loop resistance will be acceptable?
- Will electrostatic or EMI shielding be necessary?

MECHANICAL

- Will tactile response be required?
- To what material will the switch be laminated?
- What number of actuations will the product receive?
- Will actuation force be a factor?

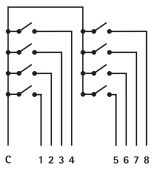
APPEARANCE

- Will edges be exposed, recessed, or covered by a bezel?
- Will embossing be required?
- Will there be different parts to the same product? (sets)

ELECTRICAL LAYOUT AND SPECIFICATIONS

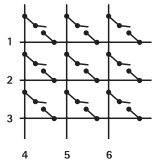
1. A pinout and/or schematic for a common bus, X-Y matrix, or combination matrix may be supplied, or ask us and we will supply the pinout for you.
2. Switches are usually rated to carry no more than 50mA. The power rating should be kept below 1/4 Watt.

Common Bus



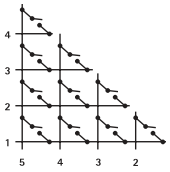
8 keys with a 9 pin connector
Minimal Interface required

X-Y Matrix



9 keys with a 6 pin connector
Encoder Interface required

Combinatorial Matrix



10 keys with a 5 pin connector
CPU Interface required

TOOLING

Steel rule dies normally achieve a tolerance of +/- 0.010" when cutting material up to 0.025" in thickness.

Hard tooling (male/female punch dies or laser cutting) will achieve a tolerance of at least +/- 0.005".

BASIC LAYOUT AND TOLERANCES

1. Edge clearance – Buttons should be a minimum of 0.250" from the edge of the switch panel.
2. Allow at least .125" spacing between keypads or printed circuitry to the edge of a window or cutout.
3. Circuitry tolerances should be +/- 0.010".
4. Avoid too many buttons in too small an area. Buttons smaller than 0.400" diameter may give awkwardness to operate.
5. Keep functional elements, such as buttons and embedded indicators, away from the toil exit location.

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SWITCH SPECIFICATIONS*

ENVIRONMENTAL

- Operating temperature -20°C to > 75°C
- Storage humidity < 95% RH
- Storage temperature -40°C to 65°C

MECHANICAL

- Operating life

Non-tactile > 5,000,000
Tactile > 1,000,000

- Contact travel 5mil to 22mil
- Actuation force > 114g

ELECTRICAL

- Contact resistance < 100 Ohms
- Insulation resistance > 10M
- Contact bounce < 10ms
- Maximum voltage 28VDC
- Maximum Power 1/4 Watt

*These specifications are typical. Your application will need to be evaluated and specifically designed to fit your needs.

GRAPHIC OVERLAY MATERIALS

Types of material: Polycarbonate (Lexan): 0.005” - 0.030” thick and Polyester (Mylar): 0.005” - 0.010” thick
Types of finishes include Gloss and Matte:

Gloss

A gloss finish yields crisp graphics and clear windows. Gloss surface finish is recommended over display for maximum clarity.

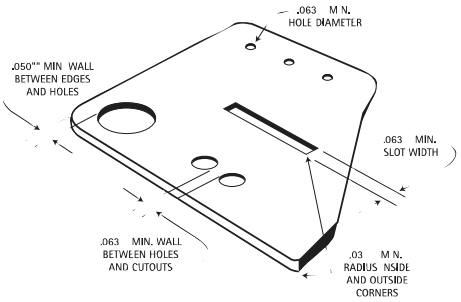
Matte - Anti-Glare

A matte or anti-glare finish gives a cleaner look, while offering design flexibility. There are various levels of matte finishes available.

Selective Textures

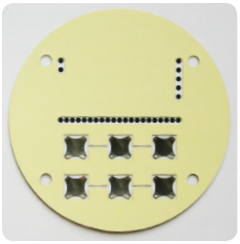
In addition to material finish choices, you can also choose selective surface finishes to diffuse light, increase durability, increase clarity, or add to the look and feel of the overlay.

CUTOUT POSITIONING



.063” minimum wall between holes and cutouts
.063” minimum hole diameter
.050” minimum between edges and holes
.063” minimum slot widths
.031 minimum radius for inside and outside corners
.500” minimum from tail exit to keypad edges, if tail exits from back of panel (when possible)

An Overlay with different textures. embossing and cutout designs



A Back of membrane layers with adhesives. 6 poly domes installed for tactile switches.

ADHESIVES

A wide variety of pressure sensitive adhesives are available to bond the touch panel to a substrate. Selection of the best adhesive will depend upon such factors as environmental conditions, type of substrate (metal, plastic, paint) and smoothness of the surface.

TACTILE FEEDBACK

Tactile feedback can be obtained using metal or poly domes. Tactile switches give the feedback of “clicking sensation” when pressed.

GRAPHIC DESIGN AND PREPARATION

1. Blueprints – Provide drawings which clearly show dimensions of all physical characteristics including colour breaks and copy. Scaling is not preferred.
2. Colours – Identify colours by using a Pantone (PMS) colour number or a colour sample. It is important to supply the exact standard to which the colour will be matched.
3. Background – Dark backgrounds and light text will provide greater clarity and show less wear and dirt.
4. Artwork – Ampco can work with your custom drawings. Please inquire for the file specifications.
5. Text – Block lettering is the most legible. Try to use common type styles. When logos, symbols, or script are used, it is best to supply in vector format. Positive letter stroke should be a minimum of .008” and .012” for negative letter stroke.
6. Borders and Outlines – Avoid outlines close to cut-outs or outer edges. Also, avoid circles within circles as any misregistration will be visually accentuated.
7. Embossing – Either a rail, pillow, or dome emboss can be provided. Embossed borders should have a minimum of 0.010” radii. Embossed areas are usually .005” to .015” high.